

*SETTING EVENTS IN APPLIED BEHAVIOR
ANALYSIS: TOWARD A CONCEPTUAL
AND METHODOLOGICAL EXPANSION*

ROBERT G. WAHLER AND JAMES J. FOX

UNIVERSITY OF TENNESSEE AND VANDERBILT UNIVERSITY

The contributions of applied behavior analysis as a natural science approach to the study of human behavior are acknowledged. However, it is also argued that applied behavior analysis has provided limited access to the full range of environmental events that influence socially significant behavior. Recent changes in applied behavior analysis to include analysis of side effects and social validation represent ways in which the traditional applied behavior analysis conceptual and methodological model has been profitably expanded. A third area of expansion, the analysis of setting events, is proposed by the authors. The historical development of setting events as a behavior influence concept is traced. Modifications of the basic applied behavior analysis methodology and conceptual systems that seem necessary to setting event analysis are discussed and examples of descriptive and experimental setting event analyses are presented.

DESCRIPTORS: setting events, correlational analyses, stimulus control, molar units of measurement

The application and adaptation of natural science methods to the study of human behavior have greatly increased our knowledge of some of the environmental conditions which influence behavior. A particularly successful instance of this application to socially significant behavior is applied behavior analysis, or ABA. In the dozen years since its formal inception, ABA proponents have investigated such diverse and important behaviors as aggression, energy consumption, social withdrawal, sexual functioning, self-injury, and academic performance. Certainly, much more is now known about how we can change certain environmental conditions to have desirable impact upon these and other behaviors. Also, by focusing on observable behavior and by analyzing the functional relationships between these behaviors and other observable events in the natural environment, ABA has helped to further a science of human behavior.

The basic model upon which these achieve-

ments rest was most explicitly and concisely stated by Baer, Wolf, and Risley (1968). Seven dimensions or criteria for applied behavior analysis were described. Briefly, ABA was to concern itself only with the actual behaviors of an individual, behaviors that were both socially important and objectively measured. Changes in these specific behaviors were to be related to deliberate and specifically described changes in social and nonsocial environmental events through experimental analyses. Behavioral techniques were effective if they produced "large enough effects to have practical value" (Baer et al., 1968), and more so if the effects were durable or generalized. Finally, behavioral procedures were to be related to a particular model or set of general principles. Though this requirement was simply that ABA be conceptually systematic to avoid collecting a grab bag of tricks and no particular model was explicitly called for, there seemed to be an implication that the model of preference was an operant one.

However, despite its obvious accomplishments, ABA has provided limited coverage and

Reprints may be obtained from Robert G. Wahler, Child Behavior Institute, University of Tennessee, 1720 Lake Avenue, Knoxville, Tennessee 37916.

understanding of human behavior and of its ecological context. Indeed, in recent years there have been proposals, both from outside and within ABA, to expand the scope of inquiry. One quite obvious example was Willems' (1974) call for behavior analysts to assume a more ecological systems approach to the study of applied problems by examining the potential "side effects" or unintended effects of behavioral intervention. This was to be accomplished by including the measurement of behaviors, persons, or situations other than those to which an intervention had been applied. Research on side effects has largely justified Willems' concerns and indicated the scientific and pragmatic utility of expansion in this area. That is, the occurrence of side effects has been repeatedly documented (Epstein, Doke, Sajwaj, Sorrell, & Rimmer, 1974; Nordquist, 1971; Sajwaj, Twardosz, & Burke, 1972; Wahler, Sperling, Thomas, Teeter, & Luper, 1970) and it has also been shown that behavioral interventions can have both negative (Sajwaj et al., 1972; Wahler & Fox, 1980) and positive (Koegel, Firestone, Kramme, & Dunlap, 1974; Strain, Shores, & Kerr, 1976; Wahler & Fox, 1980) side effects.

A more recent argument for expansion of ABA has come from within its ranks. Wolf (1978) has argued for the subjective measurement and evaluation of behavior change, i.e., social validation. Like side effects research, social validation studies did and continue to constitute an extremely small percentage of behavior analytic research. Yet, again the expansion of ABA to include this type of subjective measurement promises benefits. Social validation research indicates that reliable, subjective measurement can be achieved (Minkin, Braukman, Minkin, Timbers, Timbers, Fixsen, Phillips, & Wolf, 1976; Twardosz, Schwartz, Fox, & Cunningham, 1979), that it can be related to observable behavior and used to analyze complex social behaviors further (Minkin et al., 1976, Twardosz et al., 1979) and that it can be used to demonstrate that socially significant behavior change has been

accomplished (Fawcett & Miller, 1975; Minkin et al., 1976).

In the above tradition we suggest that ABA can benefit from further conceptual and methodological expansion. In contrast to previous proposals, our suggestions focus upon expanding the other side of the functional analysis equation. That is, we propose that behavior analysts should increase the range of environmental phenomena that they seek to manipulate and relate to the changes in socially important behaviors. We would paraphrase Kantor's (1970) friendly critique of the experimental analysis of behavior and argue that the operant conceptual model so dominant in ABA research has resulted in an undue emphasis on the relatively simple and temporally proximate conditions of behavior influence, i.e., the immediate antecedents and consequences of behavior. One can easily conceive of more complex and temporally distant behavior—environment interactions that potentially influence behavior. There also appears to be a developing data base to support such conjecture (e.g., Krantz & Risley, 1977; Wahler, 1980; Wahler, Leske, & Rogers, 1979). In short, we contend that behavior analysts can profitably investigate the relationship of these "setting factors" (Kantor, 1959, 1970) to human behavior change through both descriptive and experimental analyses.

Setting Factors and the Analysis of Behavior

If setting factors are to be included in the analysis of behavior, then it is necessary to distinguish between setting factors and other behavior influence concepts. Although setting factors have been given relatively less research emphasis than other concepts, some behavioral philosophers and researchers have discussed and attempted to research the effects of setting factors.

In his presentation of an "interbehavioral psychology," Kantor (1959) described "setting factors" as part of an interbehavioral field which also included stimulus functions, response functions, historical processes, and the media of con-

tact between an organism and its environment. Briefly, he defined setting factors as those "immediate circumstances" that influenced which of the various stimulus-response relationships (already built up through past organism-environment interactions) would occur. Kantor (1959) further identified setting factors in the following way:

Such setting factors as the hungry or satiated condition of the organism, its age, hygienic or toxic condition, as well as the presence or absence of certain environing objects clearly influence the occurrence or non-occurrence of interbehavior. . . . (p. 95)

Clearly, setting factors were considered distinct from stimulus events that were simple, discrete, immediate events or objects. That is, setting factors consisted of more complex conditions such as food deprivation, or durational events such as the presence (or absence) of another person. Temporally, setting factors preceded and overlapped with the occurrence of a particular stimulus and response function. Finally, the effect of setting events was to facilitate or to inhibit the occurrence of existing stimulus and response functions that followed the setting event.

Later, Bijou and Baer (1961) discussed the concept of setting events in the context of a child's developing psychological environment, referring the reader to Kantor's earlier (1959) work. Like Kantor, Bijou and Baer distinguished between two classes of antecedent events: setting events and stimulus events. Setting events were again described as environmental conditions or events that were more complex than the simpler more discrete stimulus events. Also, Bijou and Baer's illustrative examples, like Kantor's, included allusions to deprivation or satiation conditions and the presence or absence of certain events or objects (e.g., verbal statements such as instructions).

However, Bijou and Baer (1961) also introduced a dimension of setting events that had not been explicitly stated previously and that has re-

ceived little emphasis since. Setting events were defined in the following way:

. . . . But, in contrast to stimulus events, setting events are more complicated than the simple presence, absence or change of a stimulus (such as turning on a light, a sudden drop in temperature, or a smile from mother). Instead, a setting event is a stimulus-response interaction, which simply because it has occurred will affect other stimulus-response relationships which follow it. (p. 21)

Those authors went on to illustrate the stimulus-response interaction aspect of setting events with the hypothetical example of an infant whose nap in his crib is typically followed by vigorous but appropriate play in his playpen. However, when outdoor noises prevented the infant from napping in his crib and instead he remained awake and active, the child later cried and protested upon being placed in his playpen. Thus, the crib-awake interaction served as a setting event for the playpen-crying behavior which occurred at a later point in time.

This definition and illustration of setting events seems crucial in two respects. First, they indicate that at least some setting events are composed not simply of a durational condition or event but of both an environmental event and the person's response to that event. Secondly, the definition of setting events as the interaction of a stimulus and a response, particularly in the infant example, admits into consideration setting events which occur wholly separate in space and time from the other, succeeding stimulus-response relationships which they influence. That is, unlike deprivation or presence-of-object setting events, the onset and offset of some stimulus-response setting events may occur well before, yet still facilitate or inhibit, the occurrence of later interbehavioral relationships.

This interactional, temporally distant dimension of setting events seems to be what Kantor (1970) intended for the experimental analysis of behavior to investigate in addition to reward

conditions. In discussing the "conditions of behavior", he stated the following:

. . . For psychological behavior in general there are obviously many other conditions localizable in and around the organism and its stimuli. For example, the hygiene of the organism, its habituation or past behavioral history, *what behavioral circumstances it has recently or just previously passed through*, the presence or absence of confining objects and numerous others. (p. 107)

If, conceptually, setting events have undergone a metamorphosis from being defined simply as durational events or conditions to the inclusion of antecedent and temporally distinct stimulus-response interactions, what do those studies in which setting events have been analyzed tell us about their definition and characteristics?

A review of such research reveals several things. First, the 1968-1977 cumulative index of the Journal of Applied Behavior Analysis, surely the major publication organ of ABA, contains only three explicit references under the descriptor "setting events," while the cumulative index for the same journal during the period 1978-1979 contains no references to setting events. Obviously then, setting events, per se, constitute an almost negligible proportion of applied behavior analytic research although they continue to be described philosophically as important components of behavioral fields by behavior analysts (Bijou, 1976; Bijou & Baer, 1961, 1965).

Secondly, our review of the setting event research literature indicates that setting events have been predominantly investigated in terms of the presence or absence of complex events rather than stimulus-response interactions. A series of studies examining generalized imitation have described such setting events as instructions not-to-imitate (Steinman, 1970a, 1970b); experimenter presence/absence (Peterson, Merwin, Mayer, & Whitehurst, 1971; Rosenbaum & Breiling, 1976) as well as experimenter hand movements, prompting statements, and the pres-

ence of specific pieces of furniture (Rincover & Koegel, 1975).

Some researchers have investigated what appear to be setting events of the temporally distinct, stimulus-response interaction type. For example, Krantz and Risley (1977) have reported that in a kindergarten class an antecedent period of vigorous activity set the occasion for reduced attention to the teacher and more disruptive behavior during a subsequent story reading activity. Interestingly enough, manipulation of this type of setting event (i.e., by providing, instead, a rest period antecedent to the story reading period) was as effective as the introduction of contingency management procedures in the control of inappropriate behavior.

Another more recent example of the stimulus-response interaction setting event has been provided by Wahler (1980) who reports that low-income parents who experience particular kinds of interactions with certain members of their functional community are unlikely to maintain the benefits of a previously successful behavioral treatment package (see Wahler & Fox, 1980) applied to their children's oppositional actions. More specifically, the children of parents whose daily contacts consist primarily of aversively rated interchanges with relatives and community helping agency personnel did not maintain reductions in their oppositional and rule violating behavior during follow-up assessment, i.e., when the treatment consultant has reduced his or her contact with the family. These parents' community interactions during baseline and follow-up conditions seemed to set the occasion for increased aversive interchanges between parents and their children, because on those days in which parents experienced fewer aversive kinfolk/helping agency contacts, their later interchanges with their children that same day were less aversive.

A third implication of the small but existing setting event literature is that setting events do not appear to be fixed activities; rather, they must be empirically and individually defined and identified. A particular setting event may be

functional for some subjects or response relationships and not for others (Kantor, 1959, 1970). Thus, Peterson et al. (1971) found that the presence of the experimenter was a setting event for generalized imitation behavior in normal children, whereas Rincover and Koegel (1975) found that each of four autistic children in another generalized imitation training study was only responsive to one of four different setting events.

It appears that although a rather definite conceptual framework for setting events exists within behavioral psychology (Kantor, 1959, 1970; Bijou, 1976; Bijou & Baer, 1961, 1965) and their importance has been verbally acknowledged, setting events have only infrequently been included in a descriptive (Bijou, Peterson, & Ault, 1968) or functional (Baer et al., 1968) analysis of behavior. The concept of setting events includes complex antecedent conditions, events and stimulus-response interactions which may overlap with or entirely preceded subsequent behaviors that they affect. Most research to date, with a few exceptions, that has examined directly setting events as conditions of behavior influence has focused on deprivational or presence/absence-of-object types of setting events. The analysis of setting events appears crucial to practical methods of behavior change both in terms of effective, initial behavior change (e.g., Krantz & Risley, 1977) and in terms of generalization (e.g., Peterson et al., 1971; Rincover & Koegel, 1975; Steinman, 1970a, 1970b) and maintenance of behavior change (Wahler, 1980).

Given this state of affairs, it seems a rather glaring omission that behavior analysts have not yet devoted more effort to the analysis of setting events. Yet, we find it somewhat difficult to criticize our colleagues for this omission because it is only recently that we have pursued our own interest in this area. Too, this interest has largely resulted from our own qualified success (or failure?) within the typical contingency management paradigm (e.g., Wahler and Moore, Note 1) and the reports of similar difficulty by others

(Ferber, Keeley, & Shemberg, 1974; Keeley, Shemberg, & Carbonel, 1976). Thus, it has only been apparent in more recent years that additional investigation into setting events was necessary. Finally, it seems, too, that some adjustment of the methodological model of ABA will be necessary if we are to understand more precisely the role of setting events in the ecology of behavior. Next, we would like to present briefly our impressions of what such expansion will involve.

TOWARD A METHODOLOGICAL EXPANSION

If setting events are to be considered in a functional analysis of behavior, some departures from standard ABA methodology will be necessary. We believe that these departures center on three methodological features: the *measurement unit*, *temporal relationships* among these units, and mode of *unit analysis*.

The Measurement Unit

Applied behavior analysis has always followed a pragmatic bent in its emphasis on concrete, molecular units of measurement. Units such as smiling, verbal approval, prompts, and disapproval are practical from a psychometric viewpoint (i.e., observer reliability) as well as from an applied perspective. In the latter case, a technology for behavioral and environmental change virtually requires its targeted units to be concrete or tangible. But, one must also realize that a focus on the fine-grained composition of an ecological field is bound to yield a limited access to that field—both in terms of assessment and change. For example, one can obtain a highly useful understanding of a child's classroom reading performance by monitoring that behavior along with a description of the reading material and social contingencies for the child's performance. However, it is also possible that some or all of that child's social and work interactions during the hour previous to reading will add variance to the obtained reading measure.

Although these behavior-environment interchanges could also be monitored in fine-grained fashion, there will come a limit to the time, money, and effort that one can expend on such setting events. A more prudent course of action would entail the initial study of these events as *global* entities—those monitored through molar units of measurement. Given that a broadly and dependably defined unit can be shown to bear functional relationships to the targeted stimulus-response interaction, *then* the more costly fine-grained analysis of that setting event would appear warranted. Through this strategy it should prove feasible to segment and categorize much of an ecological field. If some of these segments do in fact serve a setting event function, an inspection of their functional properties as global categories would seem a reasonable first step in methodology.

Time Relationships among the Units

In the search for functional relationships among chosen stimulus and response units, applied behavior analysts are likely to hold a conceptual bias about time. Stimulus control conceptions typically imply brief temporal associations between likely stimuli and their socially relevant targeted responses. Thus, notions concerning parent influences on child behavior are apt to steer one's attention to the things a parent does and says contiguous with those child behaviors of designated interest. And, if these parental stimuli are not viewed as contiguous, they are almost certain to be removed briefly as immediate antecedents and/or consequences of the child behaviors. We believe that Baer et al. (1968) refer to this bias in their argument that applied behavior analysis is best advanced through *conceptually systematic* guidelines. There can be little doubt that advances thus far have been promoted by reinforcement principles designating the crucial temporal relationships described above.

We think it only reasonable to put aside such temporal guidelines in fostering the study of setting event phenomena. Obviously there are no

a priori assumptions concerning ideal or even necessary time spans between a suspected setting event and a particular target behavior. Thus, Krantz and Risley's (1977) demonstration of quiet play as a setting event for preschoolers had little to do with the temporal properties of reinforcement principles. These investigators showed that child attention during a group activity could be substantially and dependably increased by scheduling a quiet play period prior to the group activity. The quiet play activity—a globally conceived child-environment interchange—clearly functioned as a setting event for the same children's attending behavior at some later time. Although this "later time" was only a few minutes in duration, it is conceivable that time separations amounting to hours could be functional in setting event operations. Perhaps the most striking new evidence behind this latter contention is seen in the adverse treatment side effects reported by Forehand, Breiner, McMahon, and Davies (1981). These investigators monitored the home and school behaviors of 16 children referred for help with their oppositional behaviors in the home setting. When a parent training program was then shown to produce therapeutic effects in the home settings, an opposite trend occurred with these children in their school settings. The multiple regression model using home therapeutic change scores and pretreatment levels of school oppositional behavior accounted for 70% of the variance in the oppositional changes at school! Thus, the home-based treatment program, at least several hours removed from the children's school settings, appeared to function as a setting event for their oppositional actions in this second location.

Mode of Unit Analysis

Perhaps the most convincing property of any study is its *experimental* demonstration of causality. The "believability" of a procedure is tremendously augmented if one can offer experimental proof of its impact. No doubt the widespread use of procedures derived from applied behavior analysis is due to the experimen-

tal tests so commonly associated with ABA—tests in which the procedures are subjected to systematic manipulations as their expected effects are monitored.

Such a functional analysis of units obviously depends on the investigator's capability to manipulate the units in some fashion. And, if the units in question are global in size, one's capability to alter their presence and absence systematically will be reduced. For example, Wahler's (1980) recent study of mother-child problem interchanges focused on the mothers' extra-family social contacts as possible setting events for these within family problems. The suspected setting events were defined as mother self-reported contacts with friends, relatives, and helping agency representatives, along with mother ratings of these contacts as positive, neutral, and negative. As discussed earlier, these contacts could have been studied in fine-grained, molecular units as were the mother-child interchanges. However, because there was little basis to assume that these contacts would affect the mother-child interactions, the cost and time required to conduct such an assessment seemed prohibitive. Instead, the relatively simple process of collecting mother reports on occurrences and valences of these contacts was initiated each time a mother-child home observation was conducted. Results showed statistically significant correlations between friendship contacts and the mother-child problems; on days marked by increments in number of friend contacts, mother-child problems were lower in frequency, and vice versa. This finding is hardly a convincing demonstration of the setting event function of mother friendship contacts, but it offers an empirical look at a heretofore speculative relationship. In other words, the ecological field encompassing family operations was described more completely through this relatively inexpensive correlational analysis.

In addition to cost and time considerations, there is yet another reason to consider correlational analyses as a part of ABA methodology. Some likely setting events may not be manipulable because of ethical and procedural problems.

For example, the day-to-day operations of a school may vary enough to permit a correlational inspection of their impact on relevant behaviors of the children and school personnel. Some of these operations, such as a single teacher's classroom routine, could and have been manipulated experimentally. Others, such as the number of hours school is in session, could not be readily manipulated because the control lies outside the cooperation of a single individual. Likewise, a mother's aversive interchanges with members of her extended family might prove to correlate with her childrearing problems—yet these kinfolk and/or the mother may refuse to cooperate in a proposal to change the quality of such interchanges. In both examples, quantitative analyses of important stimulus-response relationships could still be made available for the scrutiny of all concerned. The interpretation of these relationships would certainly be more subdued than ABA researchers are accustomed to handling; nevertheless, it would seem that a step well beyond speculation could be attained through the obtained correlation coefficients.

If we are to maintain our positions as behavioral scientists, then some analysis of potential setting events that are not directly manipulable is necessary. As Kantor (1970) has noted, the purpose of any science is to get knowledge and then to use it. Consequently, we must recognize experimental analysis as simply one of many tools in answering questions that we pose about behavior. Simply because some specific aspect of the interbehavioral field is currently uncontrollable (in the sense of being directly manipulable by the scientist) this does not diminish such an event's effects upon behavior or its importance in an analysis of behavior. Actually, the mixture and complementarity of descriptive analyses were pointed out previously by behavior analysts (Bijou et al., 1968) and we are simply suggesting that the study of some (not all) setting events may necessitate the use of this complementary methodology. Indeed, it may occur that positive results of descriptive setting event analyses may set the occasion for later experimental analyses.

If ABA researchers proceed with the above methodological guidelines, we would anticipate an initial period of theoretical confusion. Imagine, for example, a consistent body of studies documenting strong and replicable correlations between some aspects of an individual's behavior and setting events far removed (temporally) from that behavior. What, then, if even a small portion of such environment-behavior relationships are shown via experimental manipulations to have causal properties? Because scientists, clinicians, and most every category of people for that matter seem to quest for theoretical understanding (Kuhn, 1970), such an array of data is apt to promote conceptual notions beyond the observable relationships. Operant and respondent concepts have been valuable guidelines for ABA because they are comprised solely of observable factors and their observable temporal and sequential relationships. Some setting event findings are simply not going to be "understandable" within these concepts. The temptation to introduce unobservable factors by way of "stretching" the operant-respondent concepts or the postulation of other hypothetical processes will be overpowering. One must keep in mind, however, that operant and respondent concepts "make sense" in a paradigmatic way only because we are familiar with day-to-day documented examples. When setting event phenomena are equally common, old shoe illustrations of environment-behavior relationships, we would predict reductions in the frantic building of hypothetical constructs.

HYPOTHESIS GENERATION: SOME LIKELY FRUITS OF THE METHODOLOGICAL EXPANSION

It is obvious that the three proposals just presented encompass some of the very objections ABA has voiced against standard psychological research. For example, the choice of molar measurement units and correlational analyses were virtual signposts of the "personality trait" era of research—an essentially nonproductive ap-

proach to human problems. Of course, much of this standard research strategy also emphasized both laboratory study and a focus on groups rather than individuals. Our proposals are to be understood in a strategic context fostering naturalistic study of individuals. With this perspective, we believe that the ABA movement could generate new research questions in a largely inductive fashion.

As the last statement might imply, our intent behind the three proposals is to formulate a means of viewing new problems for ABA. In the long run, one must eventually conduct *experimental* analyses dealing with *molecular* units comprising the chosen problem. If one is to provide technological solutions to applied problems, these mainstay strategies of ABA are essential. Thus, we see the proposed methodological expansion as a set of *preliminary* guidelines that might well stimulate the inductive process of question asking. Like most "new" proposals, there are already published examples of this process. Environmental settings considered in these examples include home or family settings, group homes, and school classrooms.

Recent home setting data by Patterson (1978) provide some fascinating correlational analyses of normal children and aggressive problem children as well as their parents. Unlike nonproblem children, the latter youngsters tended to increase the likelihood of aggressive actions when such behaviors were followed by parent disapproval. In fact, these "acceleration" tendencies were shown to correlate positively with the children's overall rates of in house aggression—the parent defined problem. Based on these statistically significant correlations, one might guess that a parent training intervention would be most successful if the focus of change were geared to these parent disapproval-linked bursts of aggressive behavior, rather than just *any* instance of child aggression. In other words, if the acceleration bursts were stopped, might such a change affect the overall rates of child aggression?

The Patterson data suggest the potential value of correlational analyses applied to a fine-

grained picture of parent-child interchanges. Wahler and Moore (Note 1) provided a broader picture in their correlational analyses of similar childhood problems. These researchers discovered inverse correlations between the problem children's observed solitary toy play and parent global reports of the children's aggression at other times of the day at home. Later, Wahler and Fox (1980) conducted the experimental analyses suggested by these data. When four aggressive children were reinforced for increments in their solitary play activities at home, clear (but, unfortunately, temporary) reductions were observed in observer-recorded and parent-recorded instances of aggression and opposition. Although this was not a highly practical finding, a setting event function of each child's solitary play was clearly demonstrated.

More recent correlational analyses of setting event phenomena have been reported by the Achievement Place research group (Wolf, 1978). These investigators have thus far completed a series of three correlational studies, each leading inductively to the next. In the first of these studies (Kirigin, Braukman, Atwater, and Wolf, *in press*), two global measures of delinquent boys' behavior in group homes and the surrounding communities were intercorrelated: Official records of youth delinquency were tracked as a possible function of these boys' self-reported satisfaction with the group home treatment program. Across all homes studied, a correlation of $-.65$ was obtained between these measures. Next, the investigators' review of the observational literature in normal and delinquency prone families suggested that family living satisfaction (and potential delinquency) may be related to the sheer frequency of prosocial interactions between the children and their parents. Thus, Solnick, Braukman, Bedlington, Kirigin, and Wolf (Note 2) directly observed proximity and talking between group home delinquent youth and their teaching parents. These fine-grained measures were then correlated with the youths' self-reported delinquency, yielding across home correlations between the delin-

quency measure and talk-proximity of $-.95$ and $-.81$, respectively. Unfortunately, this potential setting event function of talk-proximity was not supported through similar correlations for the individual youths. Nevertheless, the grouped data correlations were encouraging enough to lead the researchers into a third correlational study: an attempt to analyze components of the talk-proximity predictor variable (Bedlington, Solnick, Schumaker, Braukman, Kirigin, and Wolf, Note 3). Once again it proved possible to predict self-reported delinquency—this time through inverse relationships between this measure and the sheer frequency of parent teaching behaviors such as modeling, praise, and feedback. If this inductively guided correlational search continues to yield setting event predictors, there is little doubt that the Achievement Place investigators will soon be ready to conduct some suggested experimental analyses.

Descriptive analyses in elementary and secondary school classroom settings have led to some equally interesting questions regarding teacher-child interchanges. White (1975), Heller and White (1975), and Thomas, Presland, Grant, and Glynn (1978) all measured the teachers' natural rates of verbal approval and disapproval during their teaching exchanges with students. Findings showed that the majority of teachers used disapproval more frequently than approval. Because the three studies covered a fairly large range and number of classrooms, it would seem reasonable to conclude that these rate differences reflect an "average" mode of classroom teaching in public schools. The findings are reminiscent of Patterson's (1978) previously discussed results indicating that "normal" children are more apt to change their actions following parent disapproval than are aggressive problem children. One might suspect that adult disapproval could function as an important teaching-parenting factor for the average child—an hypothesis for future research work in ABA.

A particularly illustrative example of setting event phenomena in schools was documented by

Fowler and Baer (1981). Their concern with increasing preschool children's interpersonal sharing focused on the impact of temporally remote reinforcement contingencies. The investigators first obtained reinforcement control over sharing in a morning play setting of the preschool by use of point rewards delivered immediately after the conclusion of morning play. In addition, observers monitored the same children's sharing in an afternoon free play setting of the preschool. Once the sharing contingent points were shown to increase sharing in the morning setting, the delivery of these reinforcers was then delayed to day's end. Following this operation, the children's sharing increased markedly in the afternoon setting, even though the points were not contingent upon sharing in this setting. Experimental variations in procedure clearly showed that these latter increments in sharing depended on the previously described reinforcement operations in the morning setting. Once completed, this setting operation had a peculiar functional impact on the now delayed point deliveries. Although these points bore no contingent relationship to the children's afternoon sharing, the children acted as if such a relationship existed. As long as sharing in the morning was consistently reinforced and its point reinforcers delayed to day's end, the temporally remote afternoon sharing could be maintained at rates well above baseline.

The foregoing examples of descriptive and experimental research have illustrated implementation of some or all of the three proposals outlined earlier. Obviously, the question-asking productivity of our proposed methodology expansion cannot be evaluated on the basis of these examples. It does seem to us, however, that a rough set of guidelines is now available to promote future searches for setting event phenomena. To do so, we have outlined two proposed changes in methodology and one conceptual change in the time concept. The studies we reviewed also suggest some initial directions concerning what aspects of the ecosystem are apt to serve setting event functions. Obviously, this

question of "what" must be considered in the same strategic sense as prior searches for reinforcers—these are often idiosyncratic and require post hoc definition. But, just as ABA has documented gross categories of likely nomothetic reinforcers (e.g. social approval), there may also be such categories of setting events. An overview of the previous studies would strongly suggest that specific sorts of behavior-environment interactions would be a profitable initial locus of the "what" question. Krantz and Risley (1977), Fowler and Baer (1981), and Solnick et al. (Note 2) indicate that episodes of positive reinforcement are likely to serve a setting event function for these reinforced behaviors in later time frames ranging from minutes to hours. Wahler (1980), Forehand et al. (1981), and Patterson (1978) point to aversive contingency episodes as also serving such a function for the aversively consequated behaviors—once again in later time frames ranging from minutes to hours. Suppose then that one wished to explore the possibility that mother-child coercive disputes were under setting event control—in addition to the possible reinforcement control exercised by each of these people. Accordingly, one might wish to look at those antecedent segments of time in which either mother or child was involved in similar sorts of environment-behavior interactions. These episodes could be between mother and child, mother and father, child and father, mother and extended family members, for instance; and, as the previous studies show, these antecedent episodes need not be in the setting where the targeted mother-child disputes occur. Following our methodological recommendations, the antecedent episodes could be recorded as global "aversive interchange" categories, perhaps through self-recording by the participants. Then, after tabulating these categories over days, one could conduct correlational analyses of score distributions made up of the setting event categories and the observed mother-child coercive disputes. It would not be difficult to imagine similar setting event quests for other socially significant behavioral interchanges such as child-

teacher instructional work, child-peer cooperative play, and other positive or desirable facets of adult and child interactions.

Notice that our preceding guideline examples start with some particular behavior-environment interaction. Our arguments in specifying such a start are purely pragmatic: (a) If that socially important behavior is not *largely* controlled by its temporally close stimulus associations, a setting event search ought to be initiated. Thus, when an ABA researcher manipulates these stimuli and finds no change, or highly variable change, the control locus may lie at more temporally distant points. As argued earlier, setting events appear to influence behavior via their functional impact on the temporally immediate stimulus contingencies for that behavior. (b) If that socially important behavior occurs in settings that are not readily influenced by the ABA researcher, setting event possibilities should be considered. Perhaps the most apparent of these instances concerns generalization of therapeutic treatment effects across settings. For example, many child behavior problems, such as stealing, fighting, truancy, and property destruction occur in settings outside the scope of most any contingency intervention program. Certainly one often can, and should, attempt to program such across setting effects by direct control of their stimulus contingencies. But, when this strategy is simply not feasible, it might well be possible to alter the function of these temporally remote stimuli through setting event operations (e.g., Fowler and Baer, 1981).

As we noted earlier, the study of setting events has thus far comprised a very small portion of ABA research efforts. We have presented a set of guidelines pointing to a means of including such phenomena within the subject matter of ABA. Although the guidelines are certainly different from those usually associated with this research movement, we do believe these proposals preserve the essential integrity of ABA—an empirical focus on observable environment-behavior relationships.

REFERENCE NOTES

1. Wahler, R. G., & Moore, D. M. *School-home behavior change procedures in a high risk community*. Unpublished manuscript, Child Behavior Institute, University of Tennessee, Knoxville, 1975.
2. Solnick, J. V., Braukman, C. J., Bedlington, M. M., Kirigin, K. A., & Wolf, M. M. *The relationship between parent-youth interaction and delinquency in group homes*. Unpublished manuscript, Department of Human Development, University of Kansas, Lawrence, 1980.
3. Bedlington, M. M., Solnick, J. V., Schumaker, J., Braukman, C. J., Kirigin, K. A., & Wolf, M. M. *Evaluating group homes: The relationship between parenting behaviors and delinquency*. Unpublished manuscript, Department of Human Development, University of Kansas, Lawrence, 1978.

REFERENCES

- Baer, D. M., Wolf, M. M., & Risley, T. R. Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 1968, 1, 91-97.
- Bijou, S. W. *Child development III: Basic stage of early childhood*. Englewood Cliffs, N.J.: Prentice-Hall, 1976.
- Bijou, S. W., & Baer, D. M. *Child development I: A systematic and empirical theory*. Englewood Cliffs, N.J.: Prentice-Hall, 1961.
- Bijou, S. W., & Baer, D. M. *Child development II: Basic stage of infancy*. Englewood Cliffs, N.J.: Prentice-Hall, 1965.
- Bijou, S. W., Peterson, R. F., & Ault, M. H. A method to integrate descriptive and experimental field studies at the level of data and empirical concepts. *Journal of Applied Behavior Analysis*, 1968, 1, 175-191.
- Epstein, L. H., Doke, L. A., Sajwaj, T. E., Sorrell, S., & Rimmer, B. Generality and side effects of over-correction. *Journal of Applied Behavior Analysis*, 1974, 7, 385-390.
- Fawcett, S. B., & Miller, L. K. Training public speaking behavior: An experimental analysis and social validation. *Journal of Applied Behavior Analysis*, 1975, 8, 125-134.
- Ferber, H., Keeley, S. M., & Shemberg, K. M. Training parents in behavior modification: Outcome of problems encountered in a program after Patterson's work. *Behavior Therapy*, 1974, 5, 415-419.
- Forehand, R., Breiner, J., McMahon, R. J., & Davies, G. Predictors of cross setting behavior change in the treatment of child problems. *Journal of Child Clinical Psychology*, 1981. In press.
- Heller, M. S., & White, M. A. Teacher approval and disapproval on ability grouping. *Journal of Educational Psychology*, 1975, 67, 796-800.

- Fowler, S. A., & Baer, D. M. "Do I have to be good all day?" The timing of delayed reinforcement as a factor in generalization. *Journal of Applied Behavior Analysis*, 1981, 14, 13-24.
- Kantor, J. R. *Interbehavioral psychology*. Granville, Ohio: Principia Press, 1959.
- Kantor, J. R. An analysis of the experimental analysis of behavior (TEAB). *Journal of the Experimental Analysis of Behavior*, 1970, 13, 101-108.
- Keeley, S. M., Shemberg, K. M., & Carbonell, J. Operant clinical intervention: Behavioral management or beyond? Where are the data? *Behavior Therapy*, 1976, 7, 292-305.
- Kirigin, K. A., Braukman, C. J., Atwater, J., & Wolf, M. M. An evaluation of the Achievement Place teaching-family model of group home treatment for delinquent youths. *Journal of Applied Behavior Analysis*. In press.
- Koegel, R., Firestone, P. B., Kramme, K. W., & Dunlap, G. Increasing spontaneous play by suppressing self-stimulation in autistic children. *Journal of Applied Behavior Analysis*, 1974, 7, 521-528.
- Krantz, P. J., & Risley, T. R. Behavioral ecology in the classroom. In S. G. O'Leary & K. D. O'Leary (Eds.), *Classroom management: The successful use of behavior modification*. New York: Pergamon Press, Inc., 1977.
- Kuhn, T. S. *The structure of scientific revolutions*. (2nd ed.). Chicago: University of Chicago Press, 1970.
- Minkin, N., Braukman, C. J., Minkin, B. L., Timbers, G. D., Timbers, B. J., Fixsen, D. L., Phillips, E. L., & Wolf, M. M. The social validation and training of conversational skills. *Journal of Applied Behavior Analysis*, 1976, 9, 127-139.
- Nordquist, V. M. The modification of a child's enuresis: Some response-response relationships. *Journal of Applied Behavior Analysis*, 1971, 4, 241-247.
- Patterson, G. R. A performance theory for coercive family interactions. In R. Cairns (Ed.), *Social interactions: Methods, analysis and illustrations*. Chicago: University of Chicago Press, 1978.
- Peterson, R. F., Merwin, M. R., Mayer, T. J., & Whitehurst, G. J. Generalized imitation: The effects of experimenter absence, differential reinforcement, and stimulus complexity. *Journal of Experimental Child Psychology*, 1971, 12, 114-128.
- Rincover, A., & Koegel, R. L. Setting generality and stimulus control in autistic children. *Journal of Applied Behavior Analysis*, 1975, 8, 235-247.
- Rosenbaum, M. S., & Breiling, J. The development and functional control of reading comprehension behavior. *Journal of Applied Behavior Analysis*, 1976, 9, 323-335.
- Sajwaj, T., Twardosz, S., & Burke, M. Side effects of extinction procedures in a remedial preschool. *Journal of Applied Behavior Analysis*, 1972, 2, 177-182.
- Steinman, W. M. The social control of generalized imitation. *Journal of Applied Behavior Analysis*, 1970, 3, 159-167(a).
- Steinman, W. M. Generalized imitation and the dissemination hypothesis. *Journal of Experimental Child Psychology*, 1970, 10, 79-99(b).
- Strain, P. S., Shores, R. E., & Kerr, M. M. An experimental analysis of "spill-over" effects on the social interaction of behaviorally handicapped preschool children. *Journal of Applied Behavior Analysis*, 1976, 9, 31-40.
- Thomas, J. D., Presland, I. E., Grant, M. D., & Glynn, T. L. Natural rates of teacher approval and disapproval in grade 7 classrooms. *Journal of Applied Behavior Analysis*, 1978, 11, 91-94.
- Twardosz, S., Schwartz, S., Fox, J., & Cunningham, J. L. Development and validation of a system to measure affectionate behavior. *Behavioral Assessment*, 1979, 1, 177-190.
- Wahler, R. G. The insular mother: Her problems in parent-child treatment. *Journal of Applied Behavior Analysis*, 1980, 13, 207-219.
- Wahler, R. G., & Fox, J. J. Solitary toy play and time-out: A family treatment package for aggressive and oppositional children. *Journal of Applied Behavior Analysis*, 1980, 1, 23-39.
- Wahler, R. G., Leske, G., & Rogers, E. S. The insular family: A deviance support system for oppositional children. In L. A. Hamerlynck (Ed.), *Behavioral systems for the developmentally disabled: I. School and family environments*. New York: Brunner/Mazel, Inc., 1979.
- Wahler, R. G., Sperling, K., Thomas, M., Teeter, N., & Luper, H. The modification of childhood stuttering: Some response-response relationships. *Journal of Experimental Child Psychology*, 1970, 9, 411-428.
- White, M. A. Natural rates of teacher approval and disapproval in the classroom. *Journal of Applied Behavior Analysis*, 1975, 8, 367-372.
- Willems, E. P. Behavioral technology and behavioral ecology. *Journal of Applied Behavior Analysis*, 1974, 7, 151-166.
- Wolf, M. M. Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of Applied Behavior Analysis*, 1978, 11, 203-214.

Received May 5, 1980

Final acceptance December 16, 1980